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Report on the intersessional senior expert group meeting on sustainable development of lithium resources in Latin America: emerging issues and opportunities

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I. Introduction

1. As a contribution to the intersessional consultative process for the nineteenth session of the Commission on Sustainable Development, the Department of Economic and Social Affairs of the Secretariat and the Economic Commission for Latin America and the Caribbean (ECLAC) co-organized a regional senior expert group meeting on the topic "Sustainable development of lithium resources in Latin America: emerging issues and opportunities", which was held at the ECLAC Conference Centre in Santiago on 10 and 11 November 2010.

2. The meeting was attended by 55 experts, including experts from Argentina, Bolivia (Plurinational State of), Chile, Mexico and Peru, as well as from Germany, Japan, the Republic of Korea and the United States of America. In addition to representatives of Governments, the private sector, academia, non-governmental organizations, international resource persons, organizations of the United Nations system and other development agencies also participated in the meeting.

3. Lithium-based batteries and energy storage technologies play an increasingly important role in laptop computers, mobile phones and other battery-powered electronic appliances. With the growing interest in electric vehicles for more sustainable transport and mobility systems, the global demand for lithium is widely expected to continue to grow significantly, offering new opportunities for both developed and developing countries. Emerging lithium-based battery technologies may also gain importance in other applications.

4. Global demand for lithium has grown very rapidly. The countries of the Latin American region have the largest known lithium resources. The world's largest producers of lithium in 2007 were Chile, Argentina, Australia, the United States, China and the Russian Federation. Large known lithium resources in other Latin American countries, in particular the Plurinational State of Bolivia, as well as in Asia and sub-Saharan Africa. Exploration efforts are increasing worldwide to widen the sources of lithium.

5. Many Latin American Governments have expressed a keen interest in further exploring and rapidly developing capacities for the sustainable production and processing of lithium carbonate. However, for such development to be sustainable, economic, social and environmental aspects must be integrated into policy decision-making.

6. The senior expert group meeting was held in the Latin American region in order to provide a broader platform for sharing information and experiences, in particular among regional experts and policymakers, as well as with visiting international lithium industry and sustainable development experts. The meeting was interdisciplinary in nature, involving both the public and the private sectors, and aimed to facilitate an independent assessment of emerging lithium-related technologies and policies.

7. As a part of its fourth implementation cycle (2010-2011), the Commission on Sustainable Development is currently reviewing the implementation of its decisions in regard to the thematic cluster, including transport, chemicals, waste management, mining, and the 10-year framework of programmes on sustainable consumption and production. The discussions, conclusions and recommendations of the senior expert group meeting aimed to provide relevant additional background information for the

upcoming debate on policy options, in particular in regard to enhancing sustainability in the transport (electric mobility) and mining sectors.

8. In accordance with General Assembly resolution 64/236, the United Nations Conference on Sustainable Development will be held in Brazil in 2012. One of the two main agreed themes of the Conference is a green economy in the context of sustainable development and poverty eradication. Greater resource and energy efficiency and low-carbon energy and transport technologies, including advanced battery technologies that require a growing supply of lithium, are widely expected to form an important part of policies and strategies aimed at a "greener economy". The conclusions and recommendations of the senior expert group meeting on sustainable development of lithium resources in Latin America presented in the annex to the present summary report may also provide useful background information for the preparatory consultative process of the Conference.

II. Opening session

9. In their opening statements, Antonio Prado, Deputy Executive Secretary of ECLAC, and Kathleen Abdalla, Chief, Emerging Issues Branch, Division for Sustainable Development of the Department of Economic and Social Affairs, welcomed the participating experts and highlighted the importance of conducting a comprehensive assessment of the potential for expanding lithium production in the Latin American region in a sustainable manner. Mr. Prado and Ms. Abdalla also expressed their gratitude to the Government of the Republic of Korea for providing generous technical and financial support for the preparations and convening of the meeting.

10. Pablo Wagner San Martin, Undersecretary of Mining, Ministry of Mining of Chile, delivered a keynote address, in which he highlighted the historic importance of mining industries for the socio-economic development of Chile. Mr. Wagner analysed important pertinent trends and issues, and explained the need for regulatory reforms in Chile that would facilitate expanded investment and increased production of lithium carbonate, in particular in the country's northern provinces. Mr. Wagner noted that Chile was among the leading producers and world market suppliers of lithium carbonate. He also noted that the global demand for lithium was widely expected to continue to grow rapidly in the years ahead.

11. Eduardo Menez, Minister, Permanent Mission of the Philippines to the United Nations and Vice-Chair of the nineteenth session of the Commission on Sustainable Development, and Jang Myung-Soo, Minister Counsellor, Embassy of the Republic of Korea in Santiago, also welcomed the participants. Mr. Menez informed the participants of the preparations for the Commission's nineteenth session. He stressed the importance and timeliness of the senior expert group meeting, which would provide a relevant input, in particular in regard to the discussion on policy options for making transport systems more sustainable. Mr. Jang noted that the Republic of Korea had become a member of ECLAC in 1997 and that it was supportive of exploring opportunities for enhancing regional and international cooperation.

III. Proceedings of the senior expert group meeting

12. Ralph Wahnschafft, Senior Economic Affairs Officer, Division for Sustainable Development of the Department of Economic and Social Affairs, expressed the co-organizers' expectation that the meeting would enhance ongoing efforts in the South American subregion to develop lithium resources in a sustainable manner and to encourage further development of lithium production in accordance with positive economic, social and environmental guidelines. He noted the specific objectives of the senior expert group meeting, which were (a) to identify and discuss sustainable development issues in the extraction and industrial processing of lithium, including economic, social and environmental aspects; (b) to compile an independent assessment of the benefits of potential for expanding lithium mining and processing at existing and potential new sites, in particular in the Latin American countries; (c) to consider the potential contribution to regional sustainable development and related policies that could enhance investment, employment and income generation, as well as benefit-sharing; (d) to discuss opportunities for improving the sustainability of lithium production and use; (e) to provide proposals for improved regulatory and legislative measures in the subregion; (f) to create an expanded informal consultative network, bridging the gaps between policymaking, science, academia and the private sector; and (g) to identify possible future projects and partnerships for international cooperation.

13. Mr. Wahnschafft introduced the provisional programme, which included a total of 21 presentations by experts, including introductory overviews, selected country reports and technical presentations by the participating experts. He thanked the participating regional and international experts for their respective professional contributions to the programme.

14. The two-day programme included expert presentations and discussions, including on the following topics: (a) assessment of national, regional and world market trends and analysis, and projection of lithium demand and supply; (b) assessment of current and future lithium application technologies (batteries, electronics and other fields); (c) lithium geological environment and resources (evaporites versus pegmatites and other lithium-bearing rocks); (d) lithium mining, processing and ultimate upgrading; (e) presentations and discussions of reports by national experts (including Bolivia (Plurinational State of), Chile and Mexico); (f) current legal environment (mining code, environmental impact assessment, social considerations, mineral beneficiation, taxes) of the mining industry in countries involved in mineral exploitation, in particular in Latin America; (g) infrastructure and natural resource requirements in lithium mining; (h) elements of environmental impact assessment of lithium mining in the short and long term; (i) local employment generation and regional social and economic development; (j) the long-term life cycle of lithium and assessment of its contribution to sustainable development (including potential for the recycling of materials); and (k) perspectives for multi-stakeholder participation and benefit-sharing.

15. The programme comprised a sequence of five technical plenary sessions. Session I on assessing the global supply and demand for lithium carbonate from salt flats was chaired by Kathleen Abdalla, Chief, Emerging Issues Branch, Division for Sustainable Development of the Department of Economic and Social Affairs. Session II on country experiences, trends, issues and policies relating to the production of lithium from salt flats was chaired by Manlio Coviello, Chief, Natural

Resources and Energy Unit and the Natural Resources and Infrastructure Division, ECLAC. Session III on enhancing sustainability in the production of lithium carbonate in Latin America was chaired by Eduardo Chaparro Avila, Economic Affairs Officer, Natural Resources and Infrastructure Division, ECLAC. Session IV on perspectives for North-South, South-South and regional cooperation in lithium resource development was chaired by Young-seok Moon, Managing Director, Energy Policy Research Group at the Korea Energy Economics Institute, Seoul. The concluding round-table discussion on conclusions and recommendations was co-chaired by Mr. Menez and Mr. Wahnschafft.

16. The sections below summarize and highlight the essential points discussed at the meeting. The complete proceedings, including audio files of all statements and presentations, as well as the various papers and slide presentations and the conclusions and recommendations adopted, are accessible from the Department of Economic and Social Affairs and ECLAC web pages under http://www.un.org/esa/dsd/susdevtopics/sdt_transport.shtml and http://media.eclac.cl/presentaciones/conferencias2010/litio/index.htm.

A. Assessment of global supply and demand for lithium carbonate from salt flats

17. Independent technical assessments, comprehensive market analysis and short- and long-term trend projections are all prerequisites for informed decision-making on lithium mining and related investment, resource development and socio-economic policies.

18. At the global level, there is a relative abundance of existing and potential future lithium supplies. However, appropriate extraction processes and related costs can vary considerably among sites. Lithium carbonate production based on the extraction of lithium chloride brine from salt flats tends to be more economical and more environmentally benign than lithium extracted from pegmatite.

19. Together, the countries of the "lithium triangle", including Argentina, Bolivia (Plurinational State of) and Chile, have the world's largest proven reserves of lithium.

20. Participants shared information on the importance of developing appropriate mining laws and regulations that enhance the mobilization of necessary investments and at the same time prevent or minimize any eventual negative economic, social or environmental impacts.

21. In 2009, world market prices of lithium carbonate declined as a result of the global financial and economic crisis. However, it is widely projected that the demand for and world market prices of lithium carbonate will increase in the future, together with the growing demand for electronic appliances and electric cars powered by rechargeable lithium-ion batteries.

22. Participants noted that large proven reserves of lithium carbonate exist and that lithium can be produced in sufficient quantities and at affordable prices for several decades to come.

23. Participants also noted that countries that produce lithium batteries need to further test and develop battery recycling technologies. They called for further

research, product standardization and the establishment of the required regulatory framework.

24. Production costs and retail prices of lithium-ion batteries for electric vehicles are still comparatively high. However, it was noted that the costs of lithium carbonate and lithium metal used in such batteries accounted for only a comparatively small portion of battery costs.

B. Experiences, trends, issues and policies relating to the production of lithium from salt flats

25. Most lithium resources are located in remote and mountainous areas. Many of these locations lack the necessary basic infrastructure in terms of roads or water and electricity supply. The participants discussed various concerns and questions regarding lithium resource development, including (a) whether the existing local natural and human resource constraints could be overcome in a sustainable and cost-effective manner in order to further develop existing or open new lithium mines; (b) which technology options were available; (c) how environmental impacts could be minimized; (d) how local communities could benefit from mining development; (e) whether supplies would be sufficient to meet the projected lithium demand growth in the electronic and automotive industries; (f) how lithium battery technologies would develop; (g) whether lithium mining and battery recycling could provide new opportunities for the "green economy"; and (h) how greater international cooperation could facilitate sustainable development.

26. The country presentations showed that there was no one-size-fits-all standard approach to lithium industry development. Many regulatory reforms have recently been implemented or are currently under consideration. The natural resource potential, environmental and climatic conditions, and many other factors vary significantly from country to country.

27. Companies engaged in the commercial development and extraction of minerals from salt flats often simultaneously produce a variety of useful products. The co-production of different products offers essential opportunities for business, marketing and customer diversification.

C. Perspectives for enhancing sustainability in the production of lithium carbonate in Latin America

28. The participants appreciated the presentation and discussion of country and company experiences, initiatives and good practice examples in lithium carbonate production from the Andean salt flats. Surface and groundwater supplies are limited in many of the salt flats and the associated catchment basins. Comprehensive studies of existing or anticipated environmental impacts are therefore essential. Most ecosystems in arid or semi-arid areas are highly vulnerable and can be affected by even minor changes in the quantity or quality of the water supply.

29. The participants discussed the challenges of managing the local economic and social impacts of mining, including potassium and lithium mining. They emphasized the importance of benefit-sharing and of involving local communities, including indigenous people, in the relevant decision-making processes.

30. The participants appreciated the sharing of information by Peru on initial experiences in implementing collaborative and participatory approaches to decision-making, including under the Extractive Industries Transparency Initiative.

31. Most of the existing potassium and lithium extraction sites in the Andean mountains were established only relatively recently, and production is projected to continue for many years. However, several participants observed that appropriate regulatory provisions are nevertheless needed to ensure the necessary financing of eventual post-mining site rehabilitation.

D. Perspectives for North-South, South-South and regional cooperation in lithium resource development

32. Participants discussed and identified a variety of opportunities for facilitating and improving the sharing of knowledge among research centres and relevant university and other academic institutes in the Latin American region.

33. It was also observed that, owing to the many site-specific variations, appropriately adapted optimal technologies and processes need to be developed. Greater North-South and South-South technical and financial cooperation will be essential to enhance the sustainable development of lithium resources in the Latin American region.

IV. Conclusions and recommendations

34. As part of the concluding round-table discussion, the participants discussed and adopted a brief summary of conclusions and recommendations, which are attached in the annex to the present report.

Annex

Conclusions and recommendations of the senior expert group meeting on sustainable development of lithium resources in Latin America: emerging issues and opportunities

1. The senior expert group meeting on sustainable development of lithium resources in Latin America: emerging issues and opportunities was co-organized by the Department of Economic and Social Affairs and the United Nations Economic Commission for Latin America and the Caribbean (ECLAC), and held at the ECLAC Raúl Prebisch Hall in Santiago on 10 and 11 November 2010.

2. The meeting was attended by 55 experts from the Latin American region and other countries, including representatives of concerned national Governments, the private sector, business associations, parastatal authorities, research institutes, academia, international organizations and civil society groups.

3. The participants discussed 21 expert presentations, including sectoral overviews assessing major issues and trends in the supply of and demand for lithium carbonate, in particular for electric mobility; country reports presented by experts from Argentina, Bolivia (Plurinational State of), Chile and Mexico; selected issue papers and presentations reflecting on perspectives for enhancing the sustainability of lithium carbonate production in Latin America, including through greater benefit-sharing and empowering local socio-economic development; and national experiences, suggestions and proposals for enhancing national, regional and international cooperation in lithium resource development.

4. After the discussions, the participants took note of a number of general conclusions and recommendations, including the following:

(a) Lithium can be extracted from various geological formations using different kinds of processes. At the global level, there is a relative abundance of existing and potential future lithium supplies. However, optimal extraction processes and related costs can vary considerably among sites. Lithium carbonate production based on the extraction of lithium chloride brine from salt flats tends to be more economical and more environmentally benign than lithium extracted from pegmatite or other sources;

(b) In 2009, sales and prices of lithium carbonate declined as a result of weak demand and the global financial and economic crisis. However, in the intermediate and long term, the global demand for and prices of lithium are widely expected to continue to increase, creating new opportunities for investment in the expansion of lithium production capacities. Many of the speakers believe that the demand for lithium will at least double in the next 10 years;

(c) Several of the salt flats in the Andean mountain region contain large amounts of lithium which can be extracted from brines in commercially viable and environmentally sound ways. Together, the countries of the "lithium triangle", including Argentina, Bolivia (Plurinational State of) and Chile, hold the world's largest proven lithium reserves;

(d) It is widely projected that mobility and the number of motor vehicles will continue to increase worldwide, in particular in the developing countries. Many vehicle manufacturers have announced plans to produce hybrid and/or plug-in electric vehicles with lithium-ion batteries and to significantly increase their market share in the future;

(e) Given the large proven reserves of lithium resources in the Latin American region, there may be no constraints in terms of resource potentials that could pose obstacles to the widely expected rapid expansion of lithium-ion battery-based electric mobility or to the continued and expanded use of lithium batteries in information technology or other electronic products;

(f) In spite of the above, it is essential for long-term sustainable development that countries that produce lithium batteries also develop and test, plan for and introduce lithium battery recycling technologies. Initial efforts are under way to enhance necessary standardization and the required regulatory framework;

(g) The successful commercialization of electric vehicles will depend, inter alia, on retail prices and the relative costs of electric vehicle batteries, which to date have remained relatively high. Participants noted that, relative to the high costs of lithium-ion batteries, the costs of lithium carbonate and of lithium contained in such batteries is actually very low (less than 5 per cent);

(h) The countries of Latin America exercise their sovereign rights to natural resource development and are presently reviewing the applicable national legislation and investment promotion strategies with a view to enhancing productivity, employment opportunities, incomes and export revenues from lithium mines for inclusive national socio-economic development;

(i) Institutions and companies engaged in the commercial development and extraction of minerals from salt flats often simultaneously produce a variety of useful products, including potassium, lithium, magnesium, nitrates, iodine or other minerals. Co-production of various products offers essential opportunities for business, marketing and customer diversification;

(j) The extraction of lithium through the evaporation of brines in salt flats can have significant impacts on the often delicate balance of limited fresh and/or groundwater supplies. Comprehensive environmental impact assessment studies and monitoring is crucial to prevent, minimize and mitigate any negative impacts on the flora, fauna and ecosystems in the salars and the adjacent areas;

(k) There is a range of new lithium extraction technologies that could go beyond the use of solar energy for evaporation and could contribute to enhance lithium production in the future;

(l) Comprehensive periodical reporting by concerned companies and other stakeholders is an essential precondition for effective information-sharing, transparency and public participation in decision-making;

(m) Large-scale mining for world markets often relies on imported equipment and temporary migrants with the required skills, offering only very limited opportunities for sustained local value-added or socio-economic development. Greater efforts are needed in many regions to further enhance local benefit-sharing and the diversification of economic activities in local communities, including those of indigenous people;

(m) In order to avoid or reduce potential social conflicts, it is essential to ensure a broad-based public participation process starting at the project planning stage, with the involvement of indigenous people and communities;

(n) Facilities for the extraction and processing of lithium are commonly expected to have a long operational lifetime. However, the application of the precautionary principle would suggest the need for a timely provision of measures to ensure the necessary financial resources for eventual post-mining site rehabilitation;

(p) The countries, institutions and companies engaged in the production of lithium carbonate in Latin America potentially share various common interests and may be able to further explore opportunities for deeper regional cooperation and information exchange that could lead to substantial mutual benefits;

(q) Greater international cooperation at various levels, including scientific, technological and financial cooperation, should support the efforts of the developing countries of the Latin American region to enhance national and regional sustainable development, including in the mining sectors.

8. The participants expressed their thanks to the co-organizers for their effective cooperation in jointly preparing and co-hosting the senior expert group meeting on Sustainable Development of Lithium Resources in Latin America, and expressed their appreciation for the generous technical and financial support of the Government of the Republic of Korea for the event.